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A WHITEFLY LIVING ON ROSES (HOMOPTERA : ALEYRODIDAE)

By Louise M. Russell

(*Entomology Research Division, Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C.*)

[Communicated by P. W. Oman]

The species originally described as *Aleurodes cotesii* Maskell lives on, and sometimes injures, roses in Asia and Europe. In this paper *cotesii* and *Bulgarialeurodes* Corbett, the genus to which this species is here assigned, are redescribed, and notes on the synonymy and biology of *cotesii* are presented. All immature stages are described ; adults are not available to me. The terms applied to structures are defined in my earlier publications (1943, *Proc. ent. Soc. Wash.* **45** : 131–132 ; 1948, *Misc. Publ. U.S. Dep. Agric.* **635** : 6–7). The less conspicuous characters are visible only in the most carefully prepared specimens.

Genus **Bulgarialeurodes** Corbett

Bulgarialeurodes Corbett, 1936, *Proc. R. ent. Soc. Lond.* (B) **5** : 18 ; Drews and Sampson, 1940, *Bull. Brooklyn ent. Soc.* **35** : 94 ; Sampson, 1943, *Ent. amer.* **23** : 199, 216 ; Sampson, 1947, *Bull. Brooklyn ent. Soc.* **42** : 48 ; Sampson and Drews, 1957, *Ann. Mag. nat. Hist.* (1956) (12) **9** : 692.

(Type species, *Bulgarialeurodes rosae* Corbett, by original designation, = *Aleurodes cotesii* Maskell. Monobasic.)

In the original description of *Bulgarialeurodes* Corbett states that the body margin is " toothed," but actually it is smooth, the submarginal ridges apparently having been mistaken for marginal crenulations. The submarginal pores are very slightly larger than, instead of being " similar in size to those of sub-dorsal area ". Corbett (p. 18) stated :

" *Bulgarialeurodes* is related to *Corbettia* Dozier. Both genera are characterized by a chain of pores around the subdorsal area but no conspicuous submarginal spines are present in *Bulgarialeurodes*."

The structures described as " a chain of pores " in *Corbettia* are rounded papillae with which scarcely visible pores and porettes are associated, but these pores are dissimilar to the invaginated ones of *Bulgarialeurodes*. The setae in *Corbettia* are larger, more conspicuous, more numerous, and are farther from the margin than in *Bulgarialeurodes*.

The following combination of characters separates *Bulgarialeurodes* from *Corbettia* and other known genera :

Submedian setae absent from thorax but present on cephalic segment and on abdominal segment 1 ; median length of abdominal segment 7 less than one-fourth that of 6 ; most intersegmental sutures terminating before subdorsum ; submarginal setae present ; a submarginal and subdorsal row of disk pores and porettes ; disk pores invaginated ; papillae absent ; vasiform orifice subcordate ; caudal furrow absent ; antennae not reaching beyond anterior spiracles.

Habit.—Living on the lower surface of leaves.

Generic description

Pupa.—Mature pupa with a fibrous secretion on dorsal surface, and a thin band of whitish, translucent, striated wax extending from ventral submargin to leaf. Nearly flat dorsally ; young pupae flat ventrally, but older ones with central part of body swollen and surrounded by wax.

Margin and submargin : margin smooth. Anterior and posterior marginal setae and submarginal ridges present. Submarginal setae in 3 pairs on cephalic segment and in 1 pair on each of abdominal segments 4–8. A submarginal row of slightly invaginated disk pores, and porettes.

Dorsal disk : cephalic, first and eighth abdominal, and caudal setae present. Disk pores slightly invaginated, pores and porettes in a subdorsal row and scattered. Transverse moulting suture anterior to thoraco-abdominal one. Intersegmental sutures well defined in median and submedian area, not defined elsewhere. Submedian depressions and pockets well defined. Median length of abdominal segment 7 less than one-fourth that of 6. Vasiform orifice subcordate. Operculum not filling orifice. Lingula extending beyond operculum, slightly expanded distally, not lobed. Caudal furrow absent.

Ventral surface : marginal wax tubes weak. Tracheal folds absent. Spiracles thimble-shaped, area around opening of thoracic ones lightly sclerotized ; anterior abdominal ones slightly smaller than others. Antennae reaching to anterior spiracles, 1-segmented ; the end abruptly narrowed, bearing numerous minute spines and 2 minute sensory setae. Beak apparently 2-segmented, apparently with 2 pairs of minute setae at tip. Legs stout, strongly curved on outer margin, segmentation indistinct ; a minute seta on basal area of each leg, anteriorly on anterior, posteriorly on middle and posterior legs ; 1 or 2 very minute setae or setal bases near distal end of each leg. A submedian pair of adhesive sacs on mesothorax. Male organ a bifid sac.

Third stage larva.—Waxy secretions not observed. Colourless, membranous. Margin smooth. Anterior and posterior marginal setae and submarginal ridges present. Submarginal setae in 3 pairs on cephalic segment and in 1 pair on each thoracic and abdominal segment. Submarginal disk pores and porettes absent, dorsal ones present. Cephalic, first and eighth abdominal, and caudal setae present. Median length of abdominal segment 7 much shorter than that of 6. Vasiform orifice subcordate. Operculum not filling orifice. Lingula extending to end of orifice.

Second-stage larva.—Similar to third stage, but without disk pores and porettes.

First-stage larva.—Similar to third stage except as follows : disk pores and porettes absent ; vasiform orifice broadly subcordate, nearer posterior end of body ; operculum transverse. Ventral surface with legs and antennae well developed.

Bulgarialeurodes cotesii (Maskell), **comb. nov.**

Aleurodes cotesii Maskell, 1896, *Trans. Proc. N.Z. Inst.* (1895) (n.s. 11) **28** : 427–428, illust.; Maskell, 1900, *Indian Mus. Notes* **4** : 145 ; Peal, 1904, *J. Asiat. Soc. Beng.* (1903) **72** : 93–94 ; Rao, 1958, *Proc. 10th int. Congr. Ent.* (1956) **1** : 331, (*cotesi* sic !) 334.

Aleyrodes cotesii Maskell, Cockerell, 1902, *Proc. Acad. nat. Sci. Philad.* **54** : 280 ; Cockerell, 1903, *Bull. Fla. Exp. Sta.* **67** : 664 ; Kirkaldy, 1907, *Bull. Div. Ent. Hawaii Bd. Commrs. Agric. For.* **2** : 51 ; Quaintance, 1908, Homoptera, Fam. Aleyrodidae, *in* Wytsman, *Genera Insect.*, fasc. **87** : 5 ; Quaintance and Baker, 1914, *Tech. Ser. U.S. Bur. Ent.* **27** : 100 ; Quaintance and Baker, 1915, *Ibid.* **27** : 112.

Trialeurodes cotesii (Maskell), Rao, 1958, *Proc. 10th int. Congr. Ent.* (1956) **1** : 331, (*cotesi* sic !) 334. (Erroneous assignment.)

Bulgarialeurodes rosae Corbett, 1936, *Proc. R. ent. Soc. Lond.* (B) **5** : 18, illust. ; Tschorbadjiew, 1939, *Mitt. bulg. ent. Ges.* (1938) **10** : 62–63, 72 ; Drews and Sampson, 1940, *Bull. Brooklyn ent. Soc.* **35** : 94 ; Sampson, 1943, *Ent. amer.* **23** : 216 ; Dobreanu and Manolache, 1955, *Bull. stiint. Acad. române* **7** : 1068–1072, illust. (in Rumanian) ; Dobreanu and Manolache, 1956, *Rev. Biol.* **1** : 132–138, illust. (in French, translation of 1955 paper.) ; Zahradnik, 1958, *Zashtita Bilja* **46** : [115]–117, illust. (**syn. nov.**).

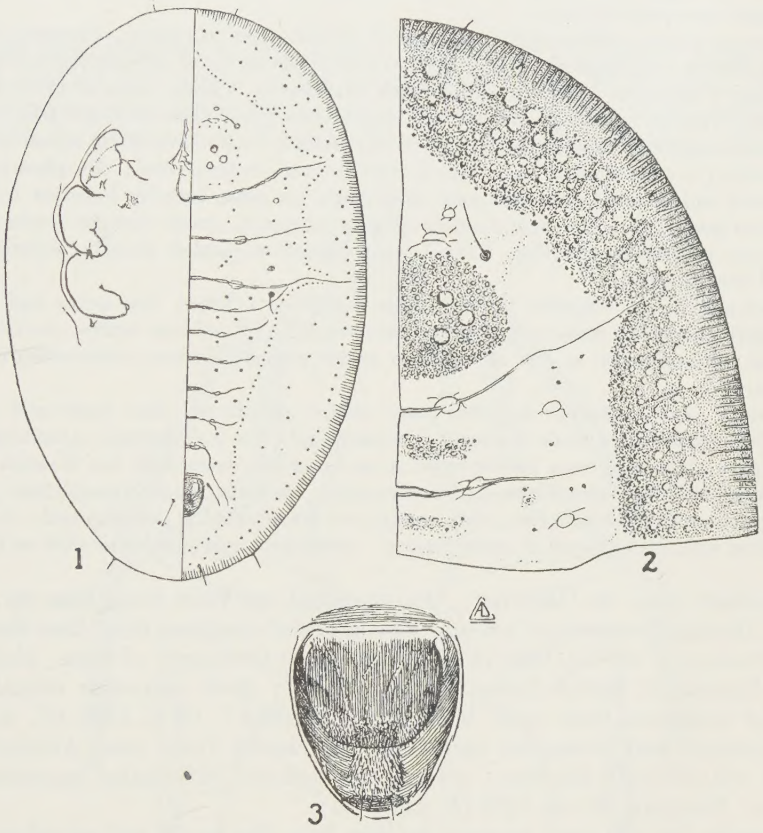
Aleurodes rosae Kirkiukhin, 1947, *Ent. Phytop. appl. Tehran* **5** : 10 (in Arabic, summary in French) (**syn. nov.**)

Pupa.—Mature pupa with a copious, white, fibrous, woolly secretion dorsally, in a mass on central portion of cephalothorax, and spreading outward from inner subdorsum around entire body to a distance three times the width of the body ; a little white powdery wax elsewhere. Colourless, yellowish, or pale brownish, membranous to lightly sclerotized. Subelliptical, slightly narrower posteriorly than anteriorly ; 0·75–0·95 mm. long and 0·45–0·60 wide (males smaller than females).

Margin and submargin : margin smooth. Anterior marginal setae about 5 μ, posterior marginal about 20 μ long. Submarginal ridges well defined and fairly uniform in width near margin, about 25 in 100 μ ; weaker and more variable in width near inner end and fading out near submarginal disk pores. Submarginal disk pores and porettes spaced at fairly regular intervals, in a single row, 16–23 on cephalothorax and 20–25 on abdomen, on each half of body. Submarginal setae

3–6 μ long, cephalic ones as near or nearer to margin than to disk pores, but abdominal ones somewhat closer to pores than to margin.

Dorsal disk : disk pores slightly smaller than submarginal ones, pores and porettes arranged as follows on each half of body : a single row roughly between subdorsal and submedian areas, extending to a point on median line of cephalic segment, on pro-mesothoracic suture and on thoraco-abdominal suture ; row curved posterior to vasiform orifice ; spaced at fairly regular intervals, 32–44 on cephalothorax and 35–49 on abdomen ; a subcircle of 7–12 on prothorax ; 5–7 in inner and outer groups or spread across submedian area on meso- and on metathorax ; 1 inner submedian on each of abdominal segments 1–7, 1 outer submedian on abdominal segment 1



FIGS. 1–3—*Bulgarialeurodes cotesii*. (1) dorsal and ventral halves of body, not showing dorsal ornamentation, × 60 ; (2) dorsal portion of cephalothorax showing details of structure and ornamentation, × 120 ; (3) vasiform orifice, × 300. (Drawings by Arthur D. Cushman, Entomology Research Division, A.R.S., U.S.D.A., Washington, D.C.)

and usually on segments 3–6 ; also 1–3 subdorsal on cephalic segment and 1 on abdominal segments 1–7 in females, but 1 or more of these often absent from males. Area between submarginal and subdorsal rows of pores ornamented by pits ; outer ones largest, others gradually decreasing in size to inner ones that are granular in appearance ; area within subcircle on prothorax and between inner submedian pores on both meso- and metathorax similarly ornamented by small pits ; remainder of dorsum smooth. Transverse moulting suture barely anterior to thoraco-abdominal one, directed very slightly diagonally from its midpoint then slightly recurved and terminating near margin, opposite its midpoint. Intersegmental sutures not extending distad of subdorsal row of pores. Median length of abdominal segments 1–5 subequal, that of segment 6 and the part of segment 8 anterior to vasiform orifice subequal ; 7 segments visible in median area of abdomen. Cephalic, and first abdominal setae, each 45–60 μ long ; eighth abdominal 35–45 μ, located barely posterior to an imaginary transverse line through anterior margin of vasiform orifice and approximately the diameter of its base from orifice ; caudal setae 18–25 μ long, located midway

between body margin and submarginal pores, their bases the length of a seta apart ; bases of all setae slightly tuberculate. Vasiform orifice subcordate, 48–60 μ long and 48–56 μ wide ; located about four-fifths its length from posterior suture and nearly one and one-third times its length from body margin ; inner walls vertical and faintly ridged near top, smooth and curved near bottom, extending anteriorly one-half length of orifice ; a shallow, transverse invagination across posterior end ; rim present and 8 μ long across anterior end of orifice, vertical and rising slightly above derm elsewhere. Operculum subcircular, 32–40 μ long and 40–48 μ wide, broadly curved posteriorly, sometimes sculptured dorsally by 3–5 depressed longitudinal lines. Lingula reaching end of orifice, 32–36 μ long, basal portion 12–16 μ wide, distal portion 16–20 μ wide at widest point, a small notch just posterior to widest portion ; a pair of setae about 10 μ long arising on ventral margin near posterior end.

Third-stage larva.—Submarginal ridges well defined close to margin. Submarginal setae minute and difficult to distinguish. A pair of inner subdorsal disk pores and porettes on each body segment. Only 7 segments visible in median area of abdomen. Caudal setae at the submargin. Derm smooth. Vasiform orifice as wide as long, located about four-fifths its length from posterior suture and its length from body margin, inner walls smooth, bottom extending about two-thirds length of orifice ; a very shallow transverse invagination at posterior end ; rim absent or weak across anterior end of orifice, vertical and above derm on sides, broadly indented to level of adjacent derm posteriorly. Operculum rather strongly narrowed, nearly straight across posterior end, occupying two-thirds of orifice. Lingula very slightly expanded distally, without lateral notches and ventral setae.

Second-stage larva.—Similar to third stage except as follows : disc pores and porettes absent ; eighth abdominal setae in line with anterior margin of vasiform orifice, caudal setae at body margin ; invagination at end of vasiform orifice scarcely evident, indentation in rim of orifice wider.

First-stage larva.—Similar to third stage except as follows : disc pores and porettes absent ; submarginal ridges weak or absent ; submarginal setae well defined, extending beyond margin ; eighth abdominal setae just anterior to an imaginary transverse line through anterior margin of vasiform orifice, caudal setae on dorsal margin ; vasiform orifice its length from posterior suture, about one-sixth its length from body margin, not invaginated at posterior end ; rim absent across anterior end, not indented at posterior end ; operculum nearly twice as wide as long.

Redescribed from the following : One mounted specimen from *Rosa* sp., Baluchistan : Quetta, (lectotype of *cotesii*) ; one mounted specimen from *Rosa damascena* (Mill.), Bulgaria : 30.viii.1930 (*P. Tschorbadjiew*) (lectotype of *rosae*, kindly lent by J. P. Doncaster, British Museum (Nat. Hist.)) ; from numerous mounted and unmounted specimens from rose, Russia : " Arkabad," 14.vi.1902 (*C. Ahirger*) ; several mounted and numerous unmounted specimens from rose, Afghanistan : Kabul, 21.viii.1958 (*D. Shallow*) ; several mounted and unmounted specimens from rose, Iran : Borujerd, 20.vii.1959 (*R. Linkfield*).

The species has also been reported on rose from Bucharest and elsewhere in the Danube plain, Rumania, by Dobreanu and Manolache ; on rose from Yugoslavia (Macedonia) by Zahradnik, and on rose from Quetta, by Rao.

Available evidence indicates that *cotesii* is usually abundant wherever it occurs. Dobreanu and Manolache stated that infested leaves sometimes became weakened and dropped prematurely, and Tschorbadjiew reported that the insect was injurious. Although parasites have not been reported in literature on the species, approximately one-third of the pupae in the material from " Arkabad " are parasitized. Dobreanu and Manolache indicated that the insects hibernate in the pupal stage on the leaves, and that the adults emerge in late April or early May. These authors described and illustrated the pupa and the adult male and female.

A NEW CAVERNICOLOUS CARABID BEETLE FROM NEW ZEALAND

By E. B. Britton

(*Department of Entomology, British Museum (Natural History)*)

I am once more indebted to Mrs. Brenda May for the opportunity to examine and describe another new species of the genus *Duvaliomimus* (Carabidae : Trechinae). The species is represented by three specimens taken by the late Peter Lambert in deep holes in the limestone area of Takaka Hill, near Nelson, New Zealand. Mr. Lambert

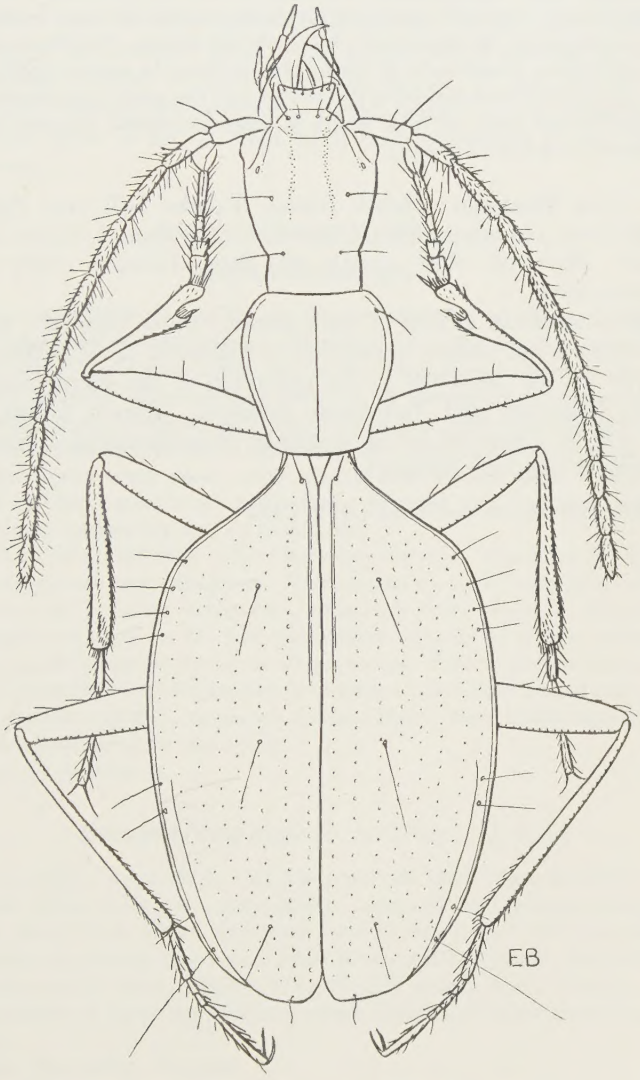


Fig. 1.—*Duvaliomimus lamberti* sp. n.

was one of a party of seven members of the New Zealand Speleological Society who made an expedition to Takaka Hill in January last. The first specimen was taken just within the dark zone of a cave opening into the bottom of Harwood Hole, at a depth of 900 feet below the surface. Harwood Hole is 200 feet wide and 850 feet deep. The party descended the side cave to a final depth of 1700 feet. The other two beetles were taken in another deep hole in the neighbourhood.

The characters of the genus *Duvaliomimus* have been given in a recent paper.[1] The new species from Takaka Hill is characterised as follows :

Duvaliomimus lamberti sp. n. (Fig. 1)

Length : *c.* 6·5 mm. *Colour* pale yellowish-brown, the head and pronotum being slightly darker than the elytra and appendages. *Head* and mouthparts elongate as in *D. mayae* but with eyes even smaller than in that species, circular, diameter *c.* 0·05 mm., comprising 6 facets only. *Pronotum* elongate, ratio of greatest width/middle length *c.* 0·92 ; posterior angles obtuse and rounded; median line impressed. *Elytra* elliptical, the chitin translucent, shoulders effaced ; striae obscure, marked by very faint punctures which are most clearly seen by transmitted light ; the sutural stria impressed in the basal half ; intervals not convex. Setiferous punctures on the head, pronotum and elytra placed as in *D. mayae*, except that the apical (third) puncture of the third interval is on the third stria instead of the second, and the lateral punctures of the pronotum are placed farther forward (ratio of total length of pronotum/length anterior to the punctures = *c.* 7 in *D. lamberti*, *c.* 4·5 in *D. mayae*).

Localities.—New Zealand : South Island, Takaka Hill near Nelson ; Dogleg Hole, depth 200 feet, January, 1959 (*P. Lambert*), holotype ♂, taken alive, paratype ♀, found dead; Harwood Hole, depth 900 feet, January, 1959 (*P. Lambert*), paratype ♀, taken alive.

The species is named in honour of the collector, Peter Lambert, who lost his life in a tragic accident in the second expedition to Harwood Hole (January, 1960).

The holotype will be deposited in the collection of the Plant Diseases Division, Department of Scientific and Industrial Research, Mount Albert, Auckland. One paratype will be preserved in the Auckland War Memorial Museum and one in the British Museum (Natural History).

[1] Britton, 1958, *Proc. R. ent. Soc. Lond.* (B) **27** : 183.

A NEW GENUS OF TRICORYTHIDAE (EPHEMEROPTERA) FROM EAST AFRICA

By M. T. Gillies

(*Malaria Institute, Amani, Tanganyika Territory*)

Among the interesting mayflies collected by Professor Lewis Berner in the course of a visit to Nyasaland was one, a nymph, which was described by Kimmins (1955) and assigned by him to the Ephemerellidae (genus uncertain). Similar nymphs are common in many types of streams in Tanganyika. But despite the striking resemblance they bear to the Ephemerellidae, the adults that emerge from them prove to belong to an aberrant Tricorythid genus, which appears to be a widespread and characteristic member of the Ethiopian fauna. In the account of the genus given here, three species are described, based mainly on the examination of fresh specimens. The types of all of them have been presented to the British Museum (Natural History).

EPHEMERYTHINAE subfam. n.

Ephemerythus gen. n.

Oculi in male only slightly larger than in female. Male fore leg, femur : tibia : tarsus 1 : 2 : 0·9–1, second tarsal segment the longest, claws similar; mid and hind legs, 1 : 1 : 0·3, claws dissimilar. Fore wing hyaline or tinted, not milky, wing fringe absent in imago; cross veins numerous, paired marginal intercalaries present in all interspaces from first radial to anterior cubital. Hind wing usually present, very small and narrow with subacute apex and tall pointed spur. Male forceps with two subequal segments, the distal segment tapering apically. Penes concealed by prominent acute penis cover arising from forceps base. Penis lobes (normally retracted) fused at base, apices acute and simple. Subanal plate in female well developed and pointed. Tails three, moderately long in both sexes.

Nymph (*see* Kimmins, 1955, figs. 8, 9) of the sprawling type. Mandibles stout, maxilla without palp, labium with glossae and paraglossae fused almost to apex, labial palp with minute third segment. Pronotum as broad as mesonotum, wing-buds fused almost to apices. Femora broad, adorned with spatulate setae, on the fore femur these forming an almost continuous transverse line just external to the point of overlap of the pronotum. Four to five abdominal gills present on segments 2–5 or 6 respectively, each consisting of an oval plate with underlying paired filaments; that on second segment elytroid, overlapping remainder; that on sixth segment, when present, consisting of a small semicircular plate only.

Type species : *E. niger* sp. n.

Ephemerythus niger sp. n. (Figs. 1–3, 6, 9)

Male imago (in life).—Eyes black, antennal segments black, filament white. Thorax black : fore femora black, tibiae colourless; tarsi dusky; mid and hind femora white in proximal two thirds, black in distal third, tibiae colourless, tarsi faintly tinged with brownish-yellow. Fore wing hyaline except at extreme base round costal brace, which is black; hind wing dusky to base of spur. Abdomen mainly white, tergites VII and VIII mainly black, X dusky. Forceps white, spines on inner surface of basal segment very small, distributed throughout length. Tails white with black rings.

Body : 5 mm. Fore wing : 5·5 mm.

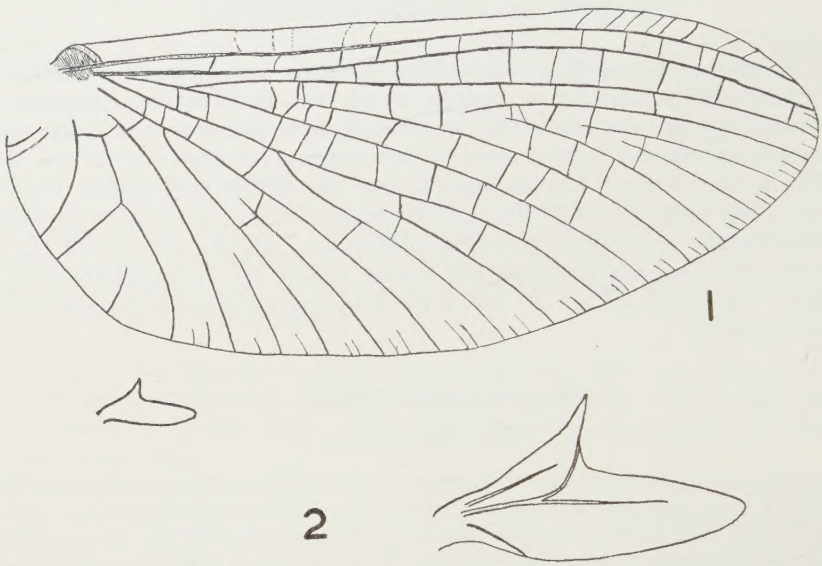
Female imago (in life).—A dark, sooty grey insect. Thorax and abdomen dark grey, posterior margins of abdominal tergites darker. Legs uniformly dark grey apart from basal half to two-

thirds of mid and hind femora, which are slightly paler. Fore wings hyaline except at wing root. Hind wings as in male ; sometimes reduced or absent. Tails dark grey.

Body : 5·5 mm. Fore wing : 6 mm.

Male subimago (in life).—Thorax greyish-brown. Abdominal tergites II–VI yellowish, VIII–X dusky. Wings slightly cloudy with very short marginal fringe.

Holotype ♂, TANGANYIKA : Amani, Tanga Province, 25.vi.56. *Paratypes*, Sigi river, below Amani ; Mkulumuzi river, Muheza, Tanga Province ; Gonja, South Pare district.



FIGS. 1–2.—Wings of male *Ephemerythus niger* : (1) fore wing (inset with hind wing to scale) ; (2) hind wing.

The male of this species is readily distinguished from the others by the abdominal markings, segments II to V being largely white. In the female of *E. niger* the hyaline fore wings are characteristic.

Ephemerythus pictus sp. n. (Figs. 4, 7, 10, 11)

Male imago (in life).—Oculi and ocelli black ; antennal scape white, pedicel black, filament white. Thorax greyish-black, with a yellowish tinge laterally. Fore femora and extreme base of tibiae black, rest of tibiae colourless, tarsi yellowish-black ; median third of mid, and second quarter of hind, femora pale, rest of femora black, tibiae dusky or colourless, tarsi yellowish-grey. Costal and subcostal areas of wing faintly dusky, especially in basal half ; hind wing brownish-purple to base of spur. Venation as in *E. niger*, but cross veins slightly more numerous. Abdominal markings (figs. 4, 7) black on dusky background, except for pale area of tergite IX which is distinctly white ; sternites VIII and IX yellowish-black. Basal segment of forceps dusky, distal segment white ; spines on basal segment scanty, largely confined to distal swelling. Tails grey with black rings.

Body : 5 mm. Fore wing : 5·5–6 mm. Tails 13–15 mm.

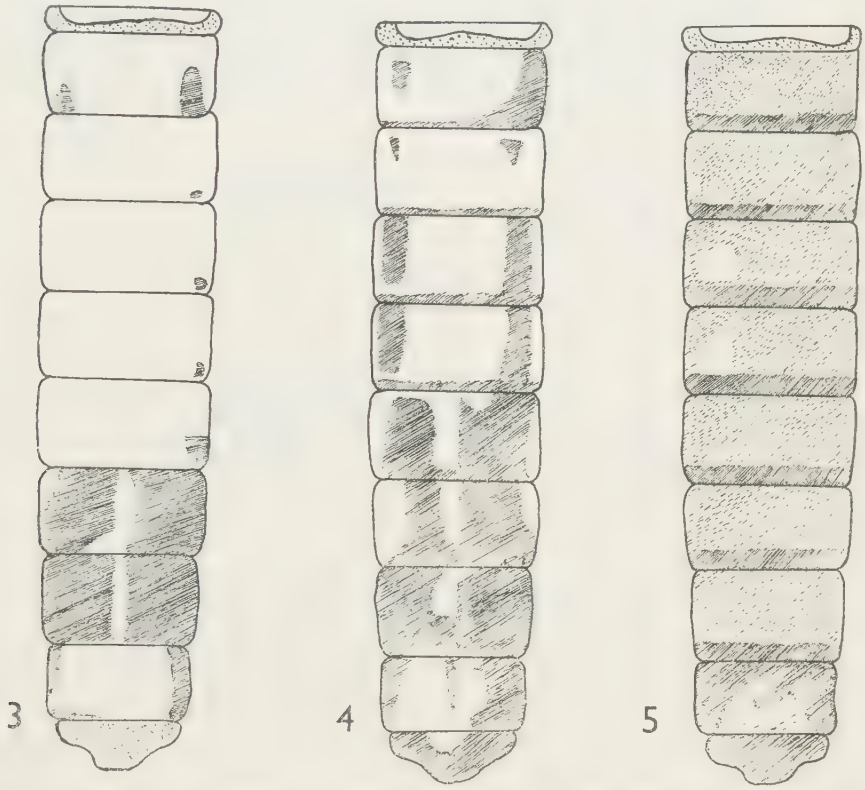
Female imago (in life).—A very dark insect. Whole body and tails a uniform dark purplish-brown. Fore legs entirely dark ; mid and hind legs similar except for an inconspicuous median pale band across femora. Fore and hind wings purplish-brown throughout.

Body : 5·5–5·5 mm. Fore wing : 5·5–6 mm.

Subamigo (in life).—In the male wings pale grey, costal and subcostal areas being darker. In the female wings and body dark purplish-grey.

Holotype ♂, TANGANYIKA: Amani, Tanga Province, 20.ix.54. *Paratypes* from the same area at altitudes from 1000–3000 feet.

The male of this species is readily distinguished from the others by the abdominal markings, in which the extent of the dark areas is intermediate between *E. niger* and *E. kiboensis*. From the former species the male of *E. pictus* can also be distinguished by the dusky tinge of the costal and subcostal areas of the fore wing. The female imago is immediately distinguishable from the other species, and indeed from all other African Ephemeroptera known to me, by the uniform deep brown tinting of the wings.



FIGS. 3–5.—Abdominal markings of male *Ephemerythus*, dorsal view showing light variations (left halves) and dark variations (right halves): (3) *E. niger*, (4) *E. pictus*, (5) *E. kiboensis*.

Ephemerythus kiboensis sp. n. (Figs. 5, 8)

Male imago (in life).—Head and oculi greyish-black, antennal scape colourless, pedicel black, filament colourless. Thorax above blackish, pleura and sternum greyish-brown. Fore femora uniform dusky, tibiae and tarsi colourless except for a faint dusky tinge to the tibio-tarsal joint; hind and mid femora brownish-black with broad central pale band, tibiae colourless, tarsi with yellowish-brown tinge. Basal two-thirds to three-quarters of costal and subcostal areas of fore wing and wing root dusky, rest of wing hyaline. Abdominal tergites mainly dusky with dark brownish-purple or black markings; sternites III–VI pale grey, remainder dusky. Basal segment of forceps dusky, distal segment white; basal segment with numerous sharp spines on inner surface extending almost to its base. Tails grey with black rings.

Body: 5 mm. Fore wing: 5·5 mm. Tails 14–15 mm.

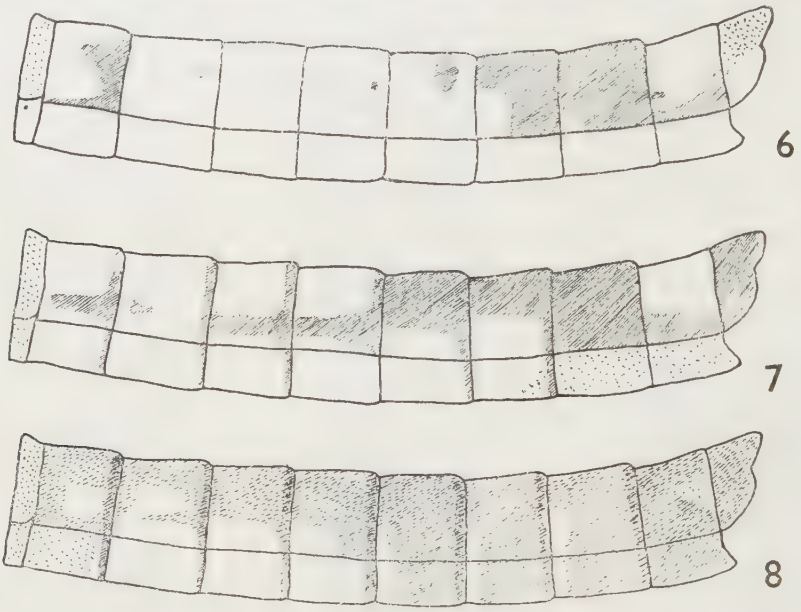
Female imago (in life).—Colouring generally as in male. Fore legs entirely dusky, mid and hind femora with faint pale median area, tibiae and tarsi dusky. Fore wing faintly but distinctly dusky throughout. Tails dark purplish-brown.

Body: 5·5 mm. Fore wing: 5·5–6 mm.

Holotype ♂, Tanganyika : Marangu, Kilimanjaro, 4500 feet, 25.x.54. *Paratypes* from same area and from Arusha, 4–4500 feet.

The male of this species is readily distinguished by the dark colouring of the abdomen. From *E. niger* it can also be distinguished by the dusky costal and subcostal area of the fore wing. In the female imago the uniform faint dusky tinge of the wings is characteristic. Specimens that are probably referable to this species, from Gonja in the S. Pare district of Tanganyika, differ slightly in having the pale areas on abdominal tergites III–V more extensive and the abdominal sternites uniformly dusky. The male subimago of this Pare form has dark iron blue wings and body and white tails. Subimagines from the type locality have not been seen.

Two of the characteristic features of *Ephemerythus* require further comment, namely the hind wings and the gills in the nymph. Females, and less commonly males, of *E. niger* are sometimes found in which the hind wing is entirely absent,



Figs. 6–8.—Abdominal markings of male *Ephemerythus*, lateral view : (6) *E. niger*, (7) *E. pictus*, (8) *E. kiboensis*.

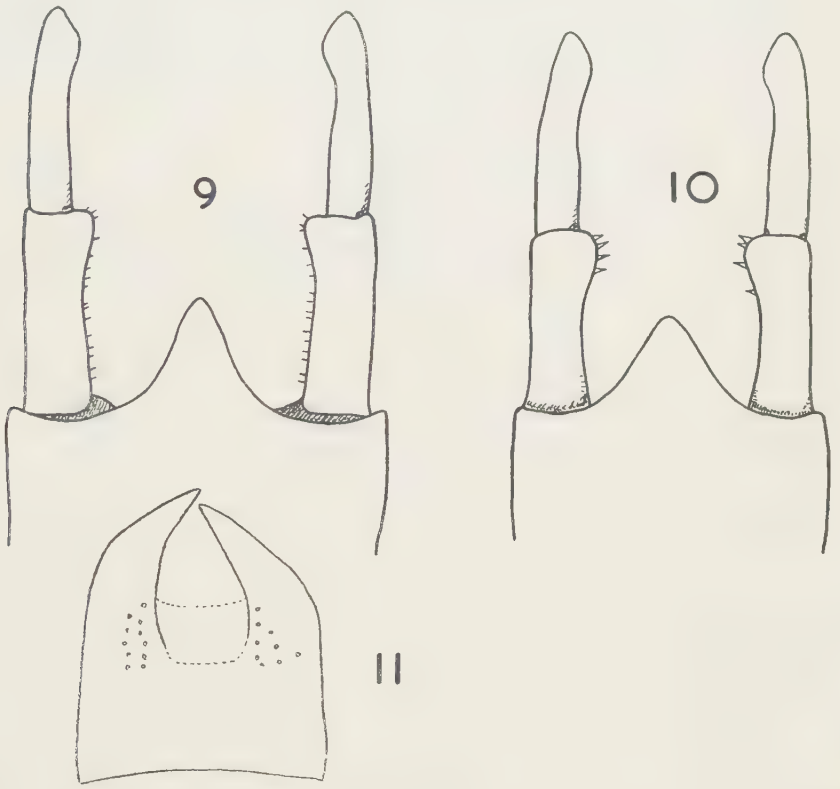
and I have seen a single specimen with a rudimentary hind wing. The venation of the fore wings, however, appears constant. The hind wing is apparently always present in both sexes of the other species described.

In the nymph from Nyasaland, described by Kimmins, gills were present on four abdominal segments. In East African material this same condition is also sometimes seen, but in other specimens an additional lamella is present on the sixth segment. Detailed study of the Tanganyika nymphs has not yet been made, and it is not possible to state whether this difference is a specific one.

Systematic Position

Edmunds and Traver (1954) recognized three subfamilies within the Tricorythidae, separated most clearly on nymphal characters. Demoulin (1955) created a fourth subfamily, Melanemerellinae, for the Brazilian genus *Melanemerella* Ulmer, 1920, originally described as an Ephemerellid. This new African genus, *Ephemerythus*, is also an undoubted Tricorythid, as shown by the great reduction in the cross veins of the fore wings, by the development of the cubital area with *CuP* angled at the

origin of *ICuA* to form what one might call the "cubital fork" characteristic of most Tricorythidae, and by the reduction in the number of segments in the genital forceps to two. Less typical of the family are the paired marginal intercalaries, the hyaline wings with absence of the marginal fringe of hairs and, least of all, the Ephemerellid aspect of the nymph. It goes some way, in fact, towards bridging the gap between *Melanemerella* and the other members of the family, and makes it clear that Demoulin's interpretation of the wing venation of that genus was undoubtedly correct. The differences between the wings of *Ephemerythus* and *Melanemerella* are, however, still very considerable, and hardly justify their inclusion in the same subfamily; and notwithstanding the possibility that the nymph of *Melanemerella*, when discovered, may prove to be similar to *Ephemerythus*, I have had no alternative but to erect a new subfamily to accommodate the latter.



Figs. 9–11.—Male genitalia of *Ephemerythus*: (9) forceps of *E. niger*; (10) forceps of *E. pictus*; (11) penes of *E. pictus*.

The African Tricorythidae are an important and a heterogeneous group, and often of great local abundance. They comprise the following four subfamilies: Ephemerythinae, with an ephemerelloid nymph; Tricorythinae, as exemplified by *Tricorythus* (s. l.), with a tricorythoid nymph; Leptohyphinae, represented by *Tricorythafer* Lestage (at least one species of this genus occurs in Tanganyika), with an apparently caenoid nymph; Dicercomyzinae, with a curiously heptagenoid nymph. In contrast, the Ephemerellidae are very poorly represented and, apart from the nymphs recorded by Marlier (1954) from the Eastern Congo and referred to as "*Ephemerellinae n. g.*" and "*Lithogloea*", they have not been found in tropical Africa. Their place, in fact, seems to be largely taken by the Tricorythidae.

Biology and Distribution

Ephemerythus nymphs occur in a wide range of habitats from cool mountain streams to warm lowland rivers. They appear to be confined to waters with moderate to fast flowing current, where they may be found on the underside of stones, in the interstices of trailing roots or plants (a typically *Ephemerella*-like refuge), in sunken logs or branches, or occasionally amongst the trash and detritus on the floor of eddies or backwaters. They are feeble swimmers but clamber with agility over submerged objects. In the South Pare Mountains of Tanganyika, *Ephemerythus* nymphs have not been found above 4500 feet, at which altitude water temperatures in the cool season (July) over two 24-hour periods ranged from 58–61° F. On Kilimanjaro, *E. kiboensis* is abundant at an altitude of 4–4500 feet, where water temperatures in October over a single 24-hour period varied between 63–71° F. Casual observations at much greater heights on the same mountain suggested that this is near its upper limit of tolerance. *E. niger*, on the other hand, is common at 3000 feet in the Eastern Usambara Mountains, but also occurs in the tiny Mkulumuzi river at Muheza, Tanga Province, at no more than 600 feet. The altitudinal range of *Ephemerythus* is evidently greater than that of most other Tricorythidae, although surpassed in this respect by *Dicercomyzon*.

On the little stream that runs through the densely forested surroundings of the Research Station at Amani, duns of *E. niger* may be caught in small numbers in almost every month of the year. They emerge shortly before dusk, just before the main hatch of Baëtidae, and the final ecdysis takes place during the course of the night. The imagines are frequently found in the daytime resting on the underside of broad leaved vegetation in the vicinity of streams, the duns rarely so. As in many other tropical mayflies, imaginal activity is mainly confined to the first hours of daylight. In the Eastern Usambara Mountains, swarms of male spinners of both *E. niger* and *E. pictus* are regularly to be seen along the precipitous course of the rivers for an hour or so after sunrise. On the cooler slopes of Kilimanjaro their activity is delayed, or possibly prolonged, and at Marangu swarms of *E. kiboensis* were observed on one occasion up till 11.30 a.m., by which time the air temperature had reached 72° F. Females are less commonly caught on the wing, but they are often abundant in cobwebs spun across the waterfalls of mountain streams.

Apart from the localities in north east Tanganyika already mentioned, and Kimmins' record from Nyasaland, I have found *Ephemerythus* nymphs in the Congo river near Brazzaville, in forest streams near Yaounde in the Cameroons, and in lowland torrents in Liberia. It is evidently a widespread and common insect in tropical Africa, and other species undoubtedly await description.

References

Demoulin, G., 1955, *Melanemerella brasiliana* Ulmer, Ephémérellide ou Tricorythide ? (Ephemeroptera). *Bull. Ann. Soc. Roy. ent. Belg.* **91** : 214–216.

Edmunds, G. F. and Traver, J. R., 1954, An outline of a reclassification of the Ephemeroptera. *Proc. ent. Soc. Wash.* **56** : 236–240.

Kimmins, D. E., 1955, Ephemeroptera from Nyasaland, with descriptions of three new species and some interesting nymphal forms. *Ann. Mag. nat. Hist.* (12) **8** : 859–880.

Marlier, G., 1954, Recherches hydrobiologiques dans les rivières du Congo Oriental. II. Étude écologique. *Hydrobiologia* **6** : 225–264.

Ulmer, G., 1920, Neue Ephemeropteren. *Arch. Naturgesch.* (A) **85** : 1–80.

THE GENUS *PARACONOSOMA* BERNHAUER (COLEOPTERA : STAPHYLINIDAE)

By W. O. Steel

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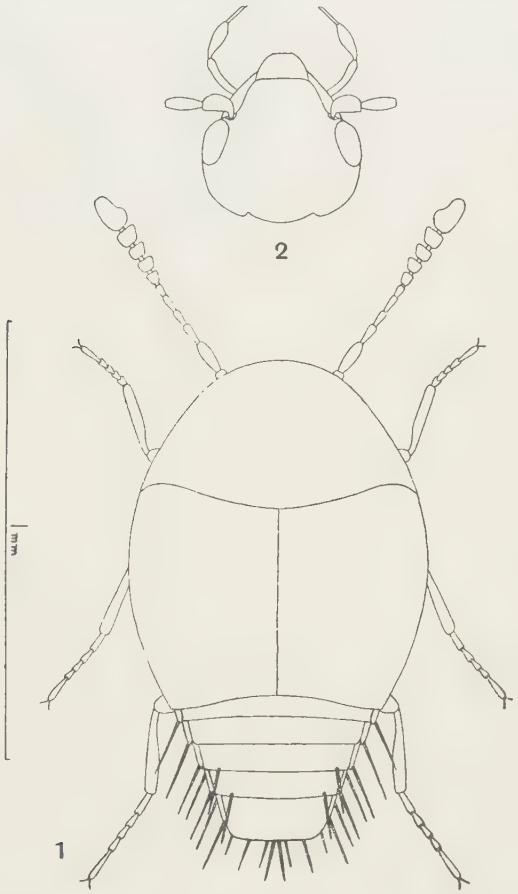
Paraconosoma was placed by Bernhauer in the Tachyporinae, tribe Tachyporini, but examination of the type species shows it to belong to the Aleocharinae, tribe Leucocraspedini. Redescriptions of the genus and the type species are given below, together with the description of a new species.

For the loan of material used in the preparation of this paper, thanks are due to the authorities of the British Museum (Nat. Hist.) and to Mrs. B. M. May, D.S.I.R., Plant Diseases Division, Auckland, New Zealand.



Figs. 1–2.—*Paraconosoma polita* sp. n.: (1) dorsal view; (2) head, viewed from the front.

Paraconosoma Bernhauer

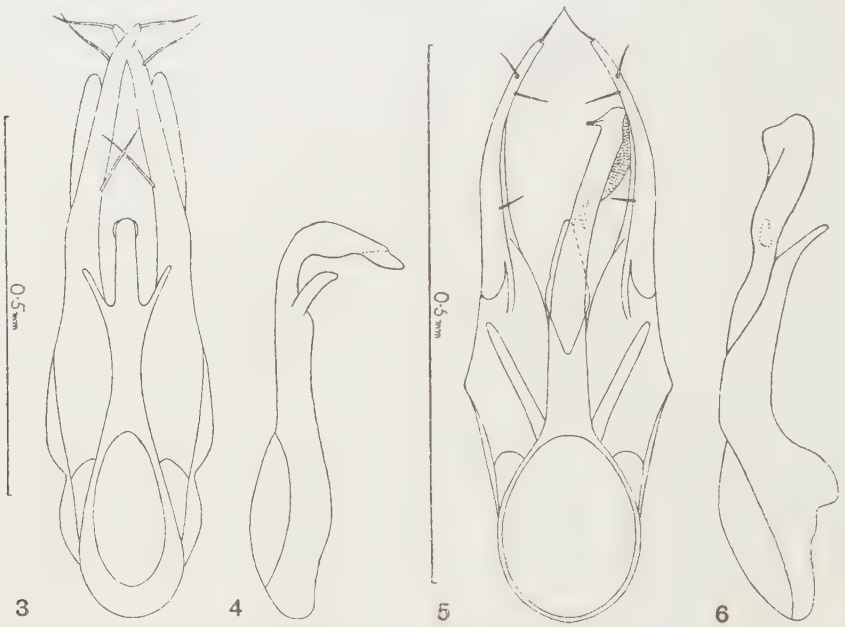
Paraconosoma Bernhauer, 1941, *Folia zool. hydrobiol., Riga* **11** : 35.
Acarellus Broun, *in litt.*

Strongly convex species, broadest across the middle of the elytra, strongly narrowed in front and behind.

Head as in figure 2, deflexed through 90° and invisible from above, the gular sutures widely separated, the temples not bordered below. Antennae rather strongly widened apically, the first

segment bent at right angles at base to counteract the deflection of the head (figs. 2 and 12), the seventh to tenth segments asymmetrical (fig. 1). Labrum rounded at sides and narrowed towards front, the front margin straight ; dorsal surface with a number of fine setae on each side. Mandibles short and stout, each with a file-like molar area at base and a rather broad membranous prostheca ; each with 2 or 3 small, rounded teeth just behind apex. Maxillae and labium as figure 7, the lobes of the hypopharynx relatively short, extending only a little in front of the base of the first segment of the labial palpi.

Pronotum rather large, transverse, strongly widened posteriorly. Prosternum narrow (fig. 8), produced ventrally between the anterior coxae. Mesosternum very short, its process broad and rounded triangular, meeting that of the metasternum (fig. 9). Metasternum relatively large, metepisterna extending as far as the hind margin of the posterior coxae. Scutellum small, normally completely hidden by the pronotum. Elytra and wings well developed.



Figs. 3–6.—(3–4) *Paraconosoma naviculare* Bernh., aedeagus : (3) dorsal view ; (4) lateral view of median lobe. (5–6) *P. polita* sp. n., aedeagus : (5) dorsal view ; (6) lateral view of median lobe.

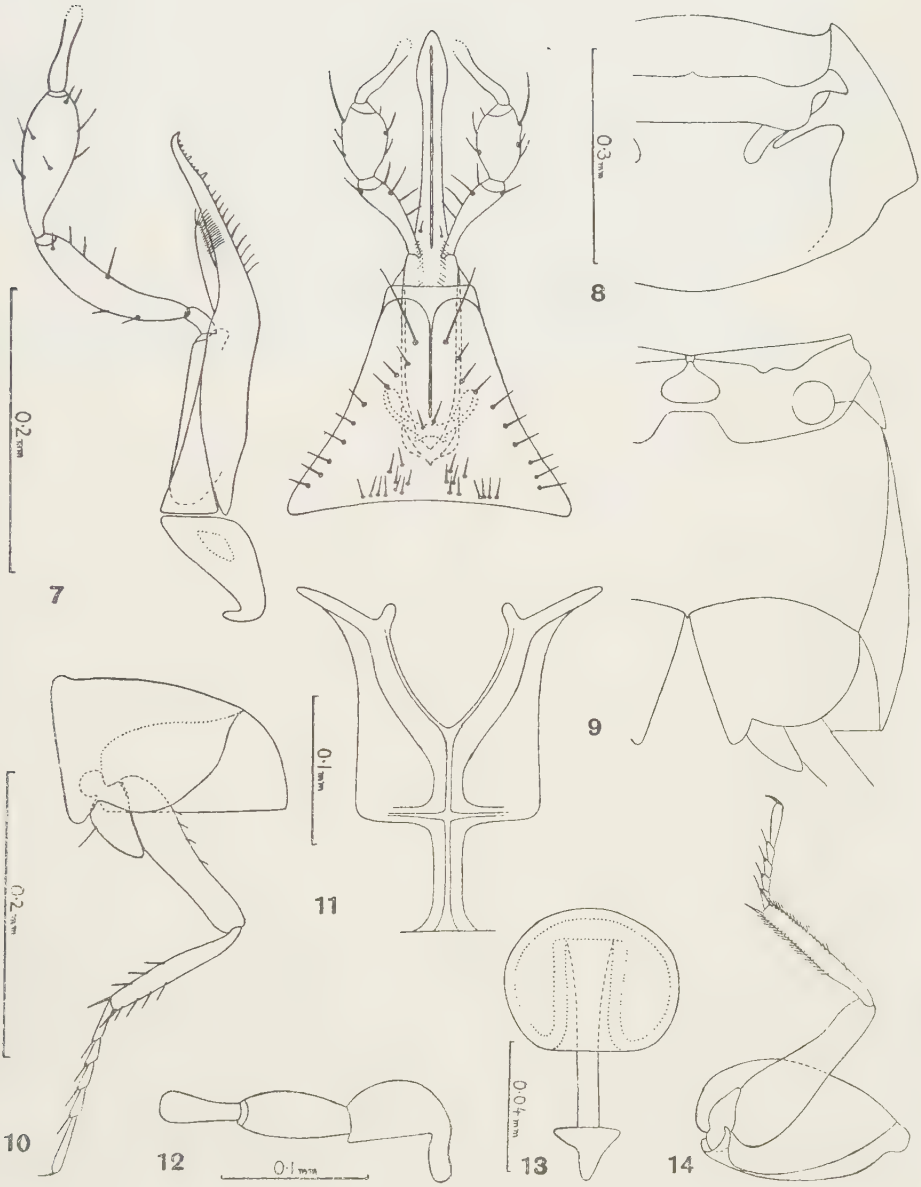
Abdomen strongly narrowed apically, the segments with long, stout, black setae at sides, the tergite of the ninth segment with 4 similar setae along apical margin. Paratergites very narrow.

Anterior coxae (fig. 14) transverse, strongly expanded above (dorsal to) the femora, posterior coxae (fig. 10) transverse, strongly expanded above (dorsal to) the femora and almost as strongly expanded below these. Anterior tibiae with numerous fine and rather short setae on each side on about apical two-thirds, the intermediate and posterior with a few longer and stouter setae on about apical half. All tarsi 5-segmented and rather long and slender, the anterior about three-quarters as long as the tibiae, the intermediate and posterior longer than the tibiae. The first segment longer than the second to fourth which are about equal in length, the fifth about as long as the preceding 2 together.

Type species : *Paraconosoma naviculare* Bernhauer.

Range : New Zealand.

In the structure of the aedeagus, apical abdominal segments and posterior coxae, this genus is typically Aleocharine. It resembles *Leucocraspedum* Kraatz in the deflexed head, the five-segmented tarsi, the structure of the anterior coxae, the hidden scutellum, the narrow paratergites, the long metepisterna and the long setae at the sides of the abdomen, and therefore fits the tribe Leucocraspedini ; it differs from the above mentioned genus in the structure of the mouthparts, meso-



FIGS. 7–14.—*Paraconosoma polita* sp. n. : (7) maxillae and labium ; (8) ventral view of prothorax ; (9) meso- and metasternum, to same scale as figure 8 ; (10) posterior leg ; (11) metathoracic furca ; (12) first three antennal segments ; (13) spermatheca ; (14) anterior leg, to same scale as figure 10.

sternum and first antennal segment. The metathoracic furca is unusual in form and is illustrated in figure 11, the lateral " wings " are distinctly less sclerotised than the stem and arms.

In his original description, Bernhauer mistook the large posterior coxae for portions of the metasternum and in describing this he states " . . . hinten in zwei durch einen schmalen Einschnitt getrennte grosse Lappen ausgezogen, unter welchen die Beine eingelenkt sind, so dass man von den Hinterbeinen nur die Schienen und Tarsen deutlich sehen kann ". This was probably because he thought he was dealing with a Tachyporine and expected the posterior coxae to be of the normal form for this subfamily, that is, not expanded ventral to the femora.

The figures showing details of the morphology have been drawn from *P. polita* sp. n. as more examples of this species were available for study. The general structure of *P. naviculare*, including the mouthparts, is exactly the same.

Key to the Known Species of *Paraconosoma*

1 Head, pronotum and elytra with close, fine, rather long, recumbent, golden pubescence . . . . . **naviculare** Bernhauer
– Head, pronotum and elytra completely glabrous . . . . . **polita** sp. n.

Paraconosoma naviculare Bernhauer. (Figs. 3, 4)

Paraconosoma naviculare Bernhauer, 1941, *Folia zool. hydrobiol., Riga* **11** : 36.

Shining. Head, pronotum and elytra dark reddish-brown, abdomen dark brown with a reddish metallic reflection. Antennae with the first 4 segments reddish-brown, the rest darker. Palpi yellowish, legs reddish-brown. Length : about 1·3 mm., without abdomen 0·91–0·96 mm.

General shape as *P. polita* (fig. 1). Head, pronotum and elytra without visible punctures or ground sculpture, with close, fine, rather long, recumbent, golden pubescence. Antennae as in *P. polita* (fig. 1).

Tergites of abdomen with moderately close, scarcely perceptible punctures, which bear fine, not very long, light coloured setae and with a row of somewhat longer and stouter setae along posterior margin ; without visible ground sculpture ; those of the third to sixth segments with a long, stout, black seta on each side near posterior margin, similar to those at the sides of the segments. Sternites with somewhat closer and longer light coloured setae.

Aedeagus as in figures 3 and 4. Female unknown.

New Zealand : South Island, Hope, Nelson District, 23.xii.1914 (*Broun*) (type) ; Greymouth, Westland.

Type in the British Museum (Nat. Hist.).

The abdomen of the type specimen is rather badly rubbed and covered with gum. The long black setae on the tergites of the third to sixth abdominal segments are missing and those at the sides are stuck tight to the body and not easily visible. For this reason these setae (except at apex of abdomen) are not noted in the original descriptions of the genus or the species. The species description states that the head is indistinctly and the pronotum sparingly, punctured. No punctures could be found, however, on the head, pronotum or elytra, even under a high power, where the pubescence was rubbed off. In some lights, the pubescence gives the impression of fine punctures. Punctures are visible on the abdomen, but only just.

Paraconosoma polita sp. n. (Figs. 1, 2, 5–14)

Acarellus politus Broun, *in litt.*

Shining. Body lighter or darker reddish-brown, the apex of the abdomen lighter. Antennae with the first 3 or 4 segments reddish-brown, the rest darker. Palpi yellowish, legs reddish-brown. Length : about 1·2 mm., without abdomen 0·80–0·85 mm.

General shape as figure 1. Head, pronotum and elytra without punctures, pubescence or ground sculpture. Antennae as in figure 1.

Abdominal tergites not very closely, scarcely perceptibly punctured, the punctures bearing fine, light coloured setae ; with a row of somewhat longer and stouter setae along posterior margins; without visible ground sculpture ; those of the fifth and sixth segments with a long, stout, black seta on each side near posterior margin, similar to those at the sides of the segments. Sternites with closer and somewhat longer light coloured setae.

Aedeagus as figures 5 and 6. Spermatheca as figure 13.

New Zealand : North Island, Pirongia, Auckland District, Dec. 1909 (*Broun*) (type) ; Hunua, Auckland District (*Drury*) ; Tarukenga, Auckland District (*Broun*) ; Waipuna Cave, Te Kuiti, Auckland District, on mould growing on rat dropping on rock 100 yards downstream from Tomo entrance, 11.i.1958 (*B. M. May*) ; Erua, Wellington District, Jan. 1910 (*Broun*).

Type and four paratypes in the British Museum (Nat. Hist.), one paratype in the collection of the D.S.I.R., Plant Diseases Division, Auckland, N.Z.

In addition to the non-pubescent head, pronotum and elytra, this species differs from *P. naviculare* in the smaller size, the absence of long black setae near the posterior margin of the tergites of the third and fourth abdominal segments and the form of the aedeagus. The abdominal tergites also have no reddish metallic reflection.

SOME RECORDS AND REDESCRIPTIONS OF BRITISH COLLEMBOLA. PART I ARTHROPLEONA, WITH A DESCRIPTION OF *MICRANURIDA CONJUNCTA* SP. N.

By D. H. Murphy

(*Department of Zoology, Durham Colleges in the University of Durham*)

The following notes are, in the main, the redescription of some British species of Collembola of which the existing descriptions are not adequate for their certain separation from more recently described forms. Although largely based on material determined by the present author, these notes are supported where possible by reference to authoritative material in the collections of the British Museum and of the University of Durham. In addition, a species new to science is described and the opportunity is taken to put on record a number of additions to the British list that have come to light during the author's collecting.

Hypogastrura scotica (Carpenter and Evans, 1899)

Since Bagnall's redescription (1940) considerable advances have been made in the taxonomy of the *H. armata* group. To place the species correctly among its allies information is required on the characters of chaetotaxy introduced by Gisin (1949). Goto (1957) recorded under *Hypogastra scotica* (C. & E.) a species from the outer Hebrides and on the basis of his material published a redescription. Extensive material from the North Pennines, while quite distinct from that examined by Goto, agrees better with the original description of *H. scotica* than does Goto's material. It is therefore necessary to publish a revised description of *H. scotica* (C. and E.) and to give to the Hebridean species a new name, *Hypogastrura* (*Ceratophysella*) *gotoi* **nom. nov.**

The original authors describe *H. scotica* as " blackish pruinose " in colour, a description supported by Bagnall (1940), and perfectly fitting the material described below.

The Hebridean species on the other hand is described as " lemon yellow with blackish patches ". From Pennine material of *H. scotica* (*sensu stricto*) this species differs further in the fact that all seven setae of the dens are long, simple and straight, whereas in *H. scotica* the two inner, distal setae are short, compressed and angular. The filament of the claw in *H. gotoi* appears to be even longer than in *scotica* and, finally, the ventral sensillae of antennal segment IV are very different, being hooked in *gotoi* and capitate in *scotica*.

The following description is for comparison with the list of characters given by Gisin (1949 : 391).

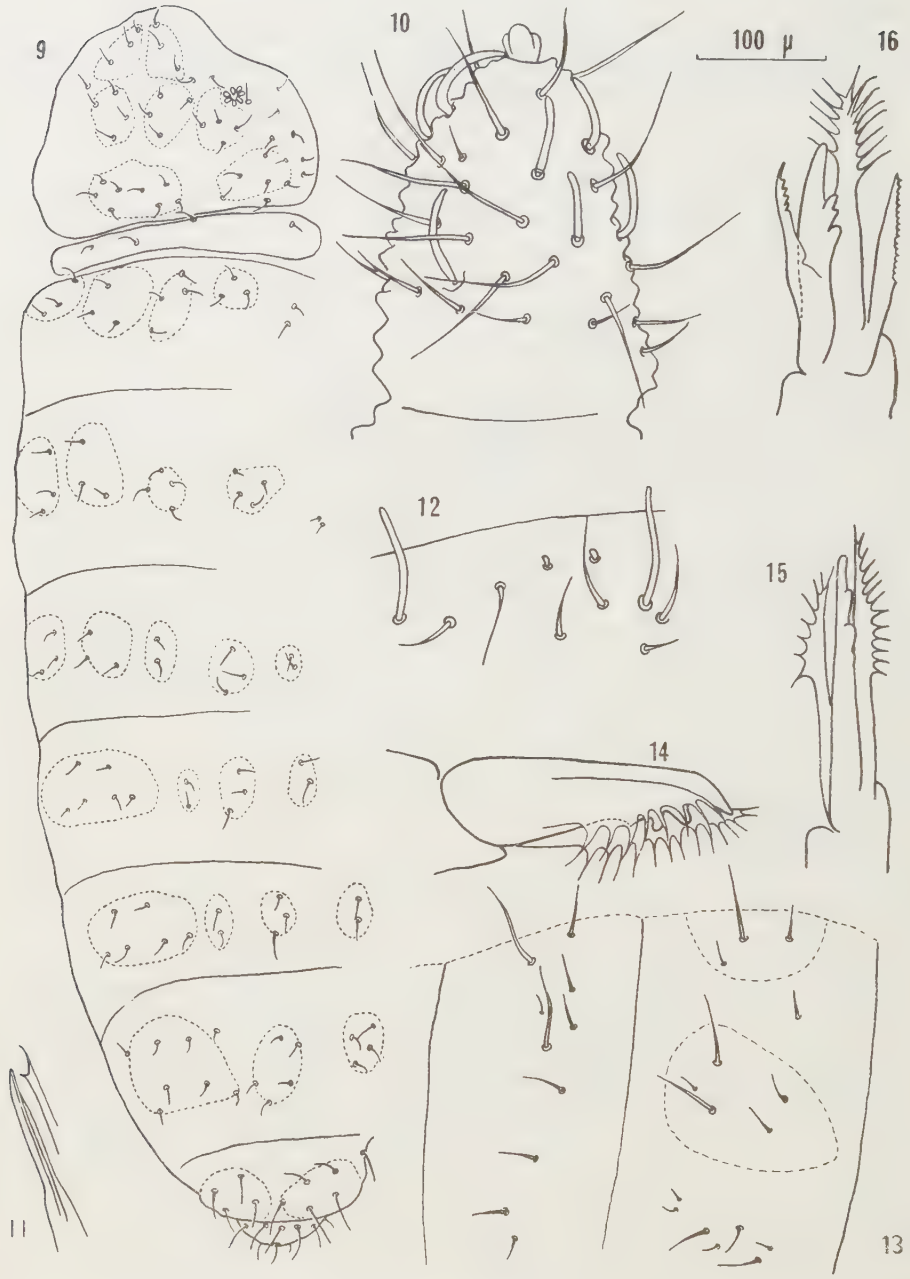
(1) Abdominal chaetotaxy (figs. 1 and 2) on segments IV and V with 2 and 3 medial, anterior setae respectively.
(2) Abd. V with enlarged cutaneous granulation, also present on IV and VI but absent from anterior segments of body (cf. *granulata*).
(3) Anal spines (AH) colourless to pale yellow, slightly shorter than claw III.
(4) Dens with 7 setae, of which the two inner and distal are broad and compressed (fig. 8).
(5) Ventral tube with 4 + 4 setae.
(6) Empodial appendage as long as or longer than inner edge of claw, angularly bent at apex and with an abrupt lamella at base ; spur hair acuminate and longest on legs I and II (fig. 5).
(7) Postantennal organ (*PAO*) (fig. 7) of *armatus* type (*sensu* Gisin, *loc. cit.* : 389).
(8) Dorsal chaetotaxy of head normal, without lancet-shaped setae.

(9) Apical papilla of Ant. IV entire or rarely with a slight trace of division (fig. 4); ventral sensillae long and not specially numerous, distinctly capitate (fig. 3).
Length up to 3·5 mm., colour bluish-black and pruinose in life. Eversible sac present between Ant. III and IV (withdrawn in fig. 4); anal papillae separated by the width of one cutaneous granule; retinaculum with 4 + 4 barbs on the rami and corpus without setae.

Material

Extensive material from peat-moors in the Pennines (*e.g.* Moor House National Nature Reserve, Westmorland, nr. Alston) and from peat-bogs near Roundstone and Athlone in Ireland.

Figs. 1–8.—*Hypogastrura scotica* (Carpenter and Evans). (1) Lateral view of Abd. 3 to 6, showing chaetotaxy and tuberculation, × 1; (2) plan of chaetotaxy in dorsal view; (3) sensillae of Ant. IV, × 4; (4) Ant. III and Ant. IV, × 2; (5) Claw III in lateral view, × 2; (6) claw III in dorsal view, × 2; (7) postantennal organ and anterior ocelli, × 2; (8) inner view of dens and mucro, × 2.
(All magnifications throughout are relative to the scale included in the figure.)



Figs. 9–12.—*Micranurida conjuncta* sp. n. (9) Dorsal chaetotaxy, × 1 ; (10) Ant. III and IV, outer aspect, × 5 ; (11) maxilla (left) and mandible (right), × 10 ; (12) sense organ of Ant. III, × 5.

Figs. 13–15. —*Anurida thalassophila* Bagnall. (13) Dorsal chaetotaxy of Abd. IV and V (paratype in Durham Coll.), × 2·5 ; (14) capitulum of maxilla, lateral view, × 10 ; (15) capitulum of maxilla, front view, × 10.

Fig. 16.—*Anurida comellinii* Gisin : capitulum of maxilla, front view, × 10.

Hypogastrura gotoi **nom. nov.**

H. scotica (C. and E.) *sensu* Goto (1957).

An excellent description of this species is given by Goto (1957), and the features distinguishing it from *H. scotica* have been discussed above in connection with that species.

Micranurida conjuncta sp. n.

This species is closely allied to *M. anophthalmica* Stach, known only from Poland. The British material is described here in comparison with the Polish species, so as to draw attention to those characters on which it has been assigned to a new species.

Agrees with *M. anophthalmica* in most particulars. Maximum size 1 mm. Body coarsely granulate with indistinct areas of larger granules slightly elevated above the surroundings; distribution of these tubercles as in *H. scotica* (fig. 1) (but it must be emphasised that only the median tubercles are clearly delimited); medial tubercles separated on Th. ii to Abd. 1 but fused in the mid-line on Abd. 2 to 5 (in *anophthalmica* all medial tubercles are separate); medial tubercles bear 3 + 3 setae on each segment from Th. ii to Abd. IV (in *anophthalmica* there are 2 + 2 on Th. ii to Abd. 1); mandible (fig. 11) with two apical teeth and no molar plate; maxilla elongate and needle-like; antennae *c.* two-thirds head diagonal; seg. IV with deeply trilobed apical papilla and six long, curved sense hairs (fig. 10) (*anophthalmica* with 5 sense hairs and weakly trilobed apical papilla); sense organ (*SO*) of Ant. III (fig. 12) with two almost parallel, clavate sense clubs (divergent in *anophthalmica*) and the usual two accessory sensillae; *PAO* with 7 to 9 tubercles arranged in a circle; ocelli absent; legs short and claw narrow, untoothed and subequal to tibiotarsus; empodial appendage and clavate hairs absent; furcula absent, but sternite 4 bears two rounded elevations with 4 + 4 setae; tenaculum and anal spines absent; colour in alcohol white. Habitus much as in *Anurida granaria* group.

Types.—Holotype in alcohol and one paratype mounted on a slide have been deposited in the British Museum (Nat. Hist.). Two further paratypes have been retained in the author's collection.

Type locality, WESTMORLAND: Moor House National Nature Reserve, near Alston, Cumberland, 27.viii.1953. Bog Hill, in *Sphagnum acutifolium* under *Calluna*.

Anurida thalassophila Bagnall, 1939

Since some confusion appears to have arisen with respect to this species, figures of maxilla and chaetotaxy are given here; these are based on a paratype in the collection of the University of Durham, supported by a series of paratypes in the British Museum (Nat. Hist.) and an individual collected from Bangor, N. Wales.

The chaetotaxy (fig. 13) agrees throughout with the description of *A. remyi* (Denis) given by Gisin (1953), but the maxilla (figs. 14 and 15) differs markedly from that described by Denis (1947, *cf.* Plate 3, no. 3).

Anurida comellinii Gisin, 1952

As no data are given in the original description on the number of lamellae in the maxilla head, a figure is given here (fig. 16) from material agreeing in every respect in its chaetotaxy with the description of *A. comellinii*. This differs in no way from the maxilla of *A. granaria* (Nicolet) *sensu* Denis (1947). The possibility of synonymy can only be settled by the latter author. The material examined here includes part of that upon which the paper of Bagnall (1939) was based.

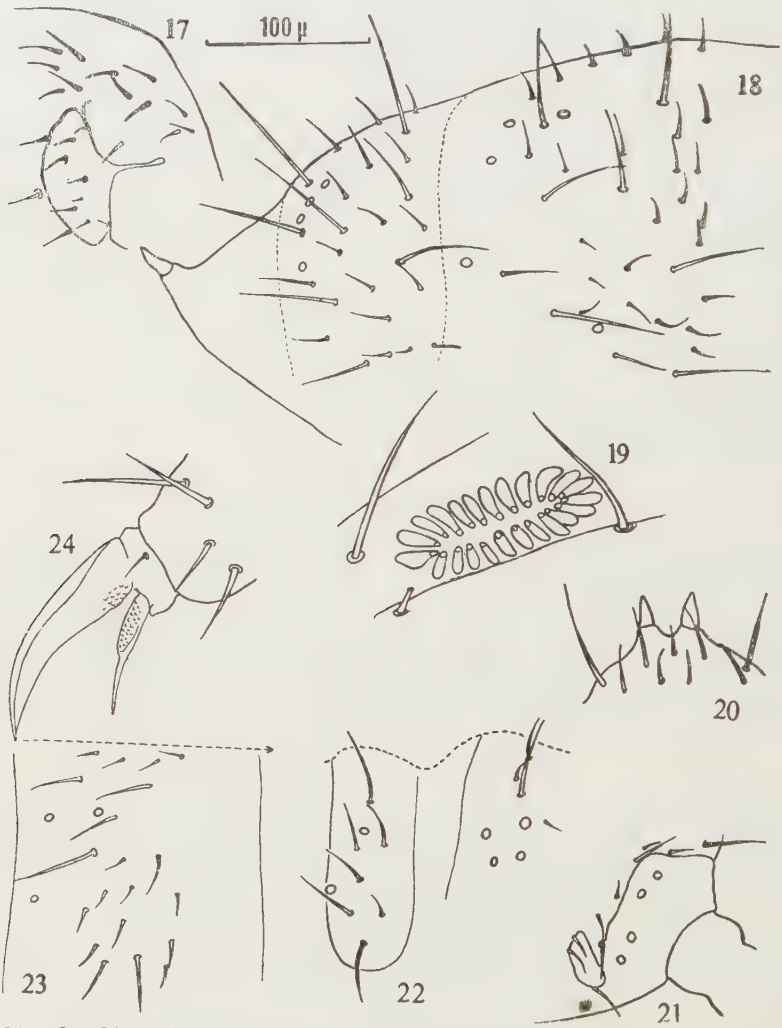
Onychiurus halophilus Bagnall, 1937

Antennal base (fig. 21) indistinctly delimited from its surroundings; *SO* Ant. III with unequal, only slightly granulate clubs and simple digitiform sense-rods; *PAO* (fig. 19) with 18–24 simple, separated tubercles; formula of pseudocelli (*PSO*), dorsal—44/22 (−3)3/44454, ventral—

2/000/1112, subcoxae (1−) 2 ; ventral *PSO* of head, 1 + 1 anterior and moderately distant from midline, 1 + 1 posterior and very lateral ; distribution of *PSO* on prothorax and hind edge of head as in figure 22 ; 3 + 3 setae between innermost posterior *PSO* of posterior margin of head ; chaetotaxy of Abd. II as in figure 23, with 2 + 2 medial macrochaetae ; chaetotaxy of Abd. IV and V as in figure 18 ; dorsal surface of Abd. VI sloping posteriorly, with one median seta and with dorsal prespinal setae on moderately convergent lines (fig. 20).

Claw untoothed (fig. 24), empodial appendage half length of inner lamella of claw with a pronounced inner "lamella"—actually a much enlarged, fleshy base ; furcal rudiment entirely absent ; no differentiated abdominal organ in the male ; ventral tube with 7 + 7 (8 + 8) distal, 1 + 1 anterior and 2 + 2 laterobasal setae ; AH : M : S in ratio 10 : 9 : 34.

The species is clearly closely allied to the *O. debilis* group, among which it is very distinct in the increased number of *PSO* on the abdominal segments and head. Juveniles frequently have fewer but apparently always have 2 + 2 on the prothorax (cf. *debilis*) and 2 + 2 on the sternite of Abd. 4 (cf. *duplopunctatus*). As it is maritime, these two are its most likely contaminants in a mixed population.



Figs. 17–24.—*Onychiurus halophilus* Bagnall. (17) Chaetotaxy of anal valves, × 1 ; (18) chaetotaxy of Abd. IV and V, lateral view, × 1 ; (19) postantennal organ, × 2·7 ; (20) dorsal prespinal setae of Abd. VI, × 1 ; (21) chaetotaxy and pseudocelli of antennal base, × 1 ; (22) Chaetotaxy and pseudocelli of prothorax and hind edge of head, × 1 ; (23) chaetotaxy and pseudocelli of Abd. II, dorsal view, × 1 ; (24) claw III, lateral view, × 2·7.

For comparison, the species so far described in this group are shown in the following table :—

Species	Dorsal *PSO*	Ventral *PSO*
halophilus . .	44/233/44454	2/000/1112
debilis . . .	32/133/33343	2/000/0000
duplopunctatus .	32/233/33343	2/000/0111
parvicornis . .	32/233/33343	2/000/0112
churchilliana .	32/233/33332	unknown

Onychiurus stachi Bagnall, 1935

O. paucisetosus Hammer, 1954, **syn.n.**

The following condensed diagnosis is based on the holotype (immature), three immature individuals from Moor House National Nature Reserve, Westmorland, and upon one immature individual in the University of Durham Collection, from Seaton Sluice, Co. Durham, determined by Dr. Bagnall.

PAO, SO Ant. III and furcal fold (fig. 27) of *armatus* type (ref. Gisin, 1952 : 7) ; *PAO* in holotype with 22 tubercles (but it should be noted that this specimen is extremely juvenile) ; *PSO*, dorsal—32/022/33332, ventral—1/000/0000, subcoxae 1 ; in chaetotaxy (fig. 25) (although possibly not complete in these juvenile specimens) very isolated within the group ; Abd. VI with a transverse row of 4 dorsal, prespinal setae, the dorsal surface itself being horizontal ; on Abd. V, the greatly elongated outer macrochaetae to which Bagnall drew attention are most unusual, as is the reduction of the medial macrochaetae. (Hammer (1954), re *paucisetosus*, regarded these as microchaetae, but from their position relative to the *PSO* they probably correspond, as Bagnall considered, to the medial macrochaetae of the *armatus* group *sensu stricto*). *Th. i* with 1 + 1 macrochaetae and without microchaetae ; claw (fig. 28) without, or with, a very indistinct inner tooth and without lateral teeth ; empodial appendage non-lamellate and tapering to a very slender, setiform apex as long as, or slightly shorter than inner edge of claw ; relative lengths of medial and lateral macrochaetae of Abd. V to AH as 11 : 28 : 10 ; AH slightly shorter than claw III (10 : 11).

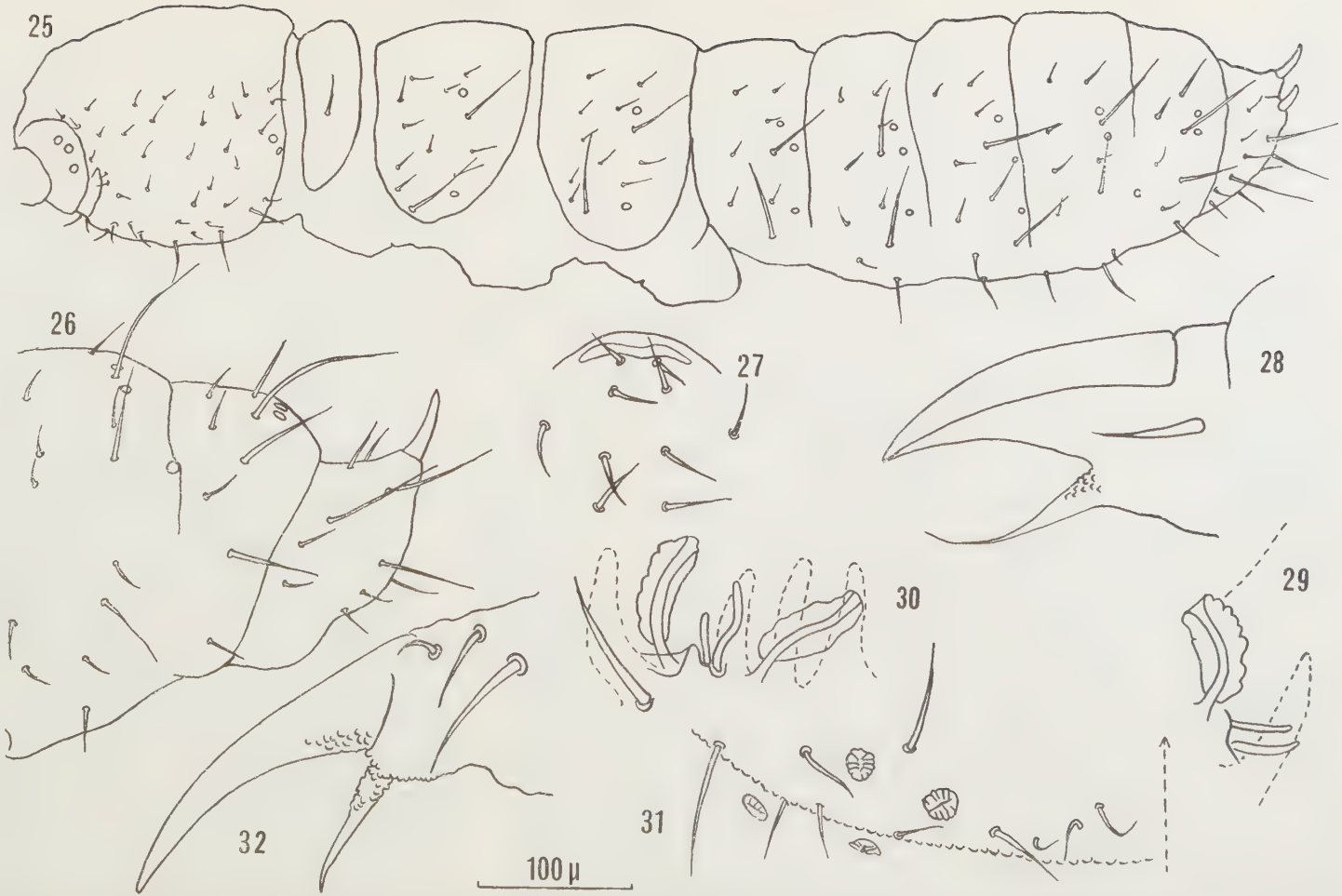
The above description, when compared with that of *O. paucisetosus* Hammer, makes it clear that the latter must fall as a synonym of *O. stachi* Bagnall.

Onychiurus edinensis Bagnall, 1935

O. spinularius Gisin, 1952, **syn. n.**

A number of specimens identified by the author have been examined, including two labelled as paratypes and stemming from the type locality. Chaetotaxy and number and position of pseudocelli agree throughout with the published description of *O. spinularius* Gisin and with the material recorded below, which was at first recorded under that name. The *SO* Ant. III (figs. 29 and 30) has lateral sensillae inclined and canaliculate throughout, but they are not completely smooth, Bagnall's description as " with roughened surface, comparatively large, broad and sharply bent " being a very just one. Whether in fact this condition is sufficient to justify its inclusion in the *ramosus* group is another matter and in the opinion of the present writer there is no doubt that Gisin was justified in including the species in the *fimetarius* group. The claws of the paratypes agree with the description of Gisin in having a small basal enlargement (fig. 32), but no truncated lamella.

The published formula of *PSO* for *edinensis* is 32/223/11443 with some reservations : that of *spinularius* 34/233/44454. The formula checked from the best preserved paratype examined was 34/2??/44454, and all other material agreed with this as far as the condition and orientation allowed the characteristics to be checked. Illustrations are given of the claw (fig. 32), posterior margin of the head (fig. 31) and the *SO* Ant. III (figs. 29, 30, all from the best paratype).



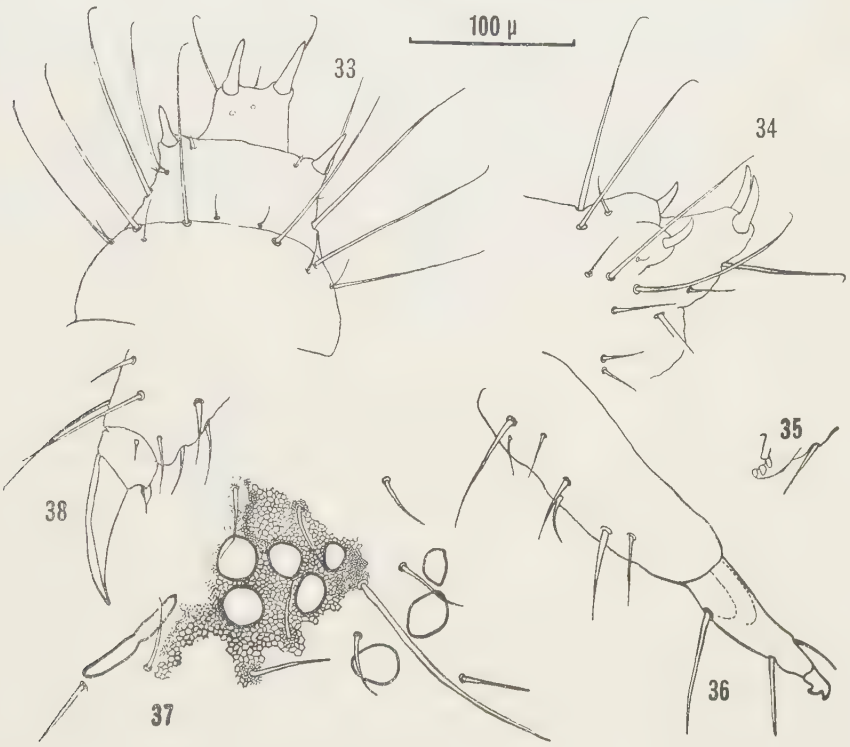
Figs. 25–28.—*Onychiurus stachi* Bagnall : (25) Dorsal chaetotaxy, × 1 ; (26) Abd. IV, V and VI in lateral view, × 2 ; (27) furcal fold, ventral view, × 4 ; (28) claw III of holotype, × 10. Figs. 29–32.—*Onychiurus edinensis* Bagnall : (29) Sense Organ of Ant. III, lateral view, × 10 ; (30) S.O. Ant. III, front view, × 10 ; (31) pseudocelli and chaetotaxy of posterior margin of head, × 10 ; (32) claw III, × 10.

For the above reasons, it is proposed that *O. spinularius* Gisin be regarded as a synonym of *O. edinensis* Bagn. The species has been recorded from :—

Herts. : Rothamsted Experimental Station, Harpenden, 27.vi.51, under wood and in turf from grazed meadowland. At this locality it appears to be one of the commonest species.

Tetracanthella brachyura Bagnall, 1949

Since the description of this species, the taxonomy of the genus has been greatly advanced, chiefly by the work of Cassagnau (1953 *et seq.*). The species therefore requires re-examination before it can be separated with certainty from nearly allied forms.



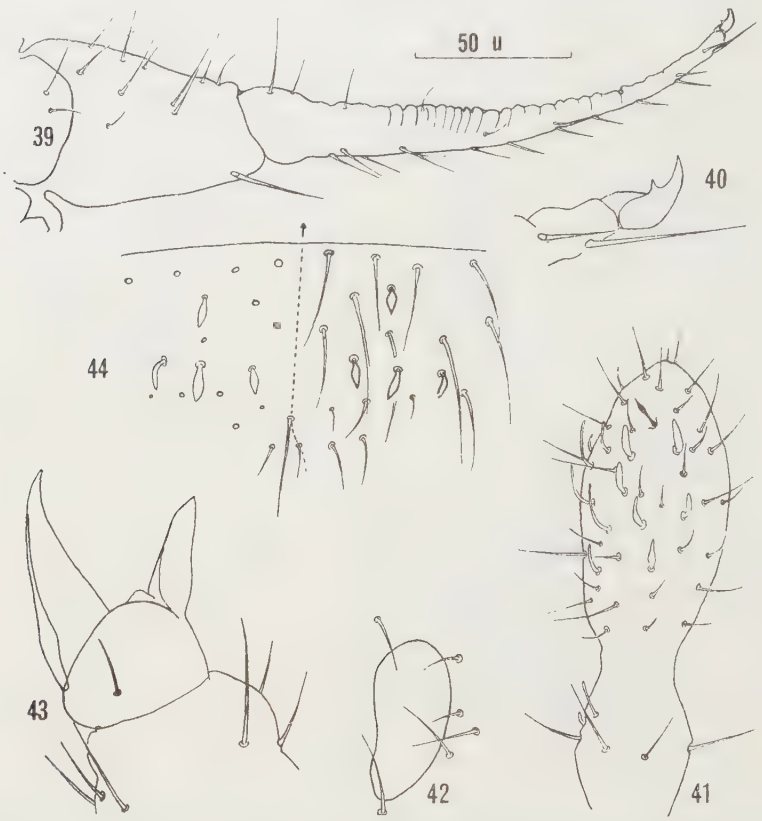
Figs. 33–38.—*Tetracanthella brachyura* Bagnall : (33) Abd. IV, V and VI, dorsal view, × 1 ; (34) Abd. V and VI, lateral view, × 1 ; (35) tenaculum, × 3 ; (36) furca, lateral view, × 3 ; (37) ocelli and associated chaetotaxy, × 3 ; (38) claw III, × 3.

Integument reticulate, with smaller reticulations at base of setae (fig. 37) ; longest macrochaetae of abd. segs. long, acuminate and usually hooked, never capitate ; ocelli 8 + 8 ; empodial appendage about one quarter inner edge of claw ; tibiotarsus with two outer tenent hairs on leg III which are slightly shorter than outer edge of claw, acuminate, not hooked ; furcula not " granuloreticulate " (*see* Cassagnau, 1953), mucrodens short, 0·6 0·7 length of manubrium, with 3 setae ; mucro short, bidentate, distinctly separated from dens ; retinaculum with 3 teeth on rami and 1 seta on corpus.

Affinities : Very closely related to *T. pyraneica* Cass., 1953, and agreeing with it in most details. Differs in the possession of 8 + 8 ocelli (as opposed to 6 + 6) and, judging by Cassagnau's illustrations, in slightly longer tenent hairs and relatively shorter proximal seta of mucrodens.

Complementary description : Maximum size 1.4 mm. ; colour dark blue ; macrochaetae on head and body tergites 2/2,2/2, 3, 4, 10 ; antennae slightly shorter than head, diagonal, with segs. I to IV as 10 : 15 : 13 : 21 ; *SO* Ant. III with slender, procumbent sense clubs lying in a deep groove and flanked by two slender sensillae ; Ant. IV typical for the genus without differentiated

sense organs ; ocelli 8 + 8 of which G and H strongly reduced ; *PAO* narrowly elliptical, constricted, about 2·5 diameter of proximal ocellus (fig. 37) ; claw (fig. 38) without lateral or inner teeth ; empodial appendage about one-fourth inner edge of claw, including the fine setiform apex ; frequently appearing even shorter owing to its concealment by base of foot ; tenent hairs 1, 2, 2 ; those on leg III slightly shorter than outer edge of claw, straight and acuminate ; furcula (fig. 36) well developed with all segments distinct ; manubrium without ventral setae, dorsally with 7 + 7 in adult ; mucrodens 0·6–0·7 length of manubrium with mucronal hooks *c.* 0·4 total length, 3 setae, the proximal about three-quarters length of mucrodens ; mucro very compact, bidentate ; AH (figs. 33, 34) strong, curved and yellow in colour, ratio of superior AH to claw III being 9 : 11 ; tenaculum (fig. 35) with 3 + 3 teeth on rami and 1 anterior seta on corpus.



Figs. 39–44.—*Isotomina scapellifera* Gisin : (39) Furca, lateral view, × 1 ; (40) mucro, lateral view, × 3 ; (41) antennal segments III and IV, × 1 ; (42) postantennal organ, × 1 ; (43) claw III, × 3 ; (44) chaetotaxy and distribution of sensillae on Abd. VI, × 1.

The above description is based upon a long series from Westmorland : Moor House National Nature Reserve, near Alston, Cumberland, in *Sphagnum subsecundum*. Other material has been examined from Co. Galway : Roundstone Bog, near Clifden, 23.vii.54, in *Sphagnum* ; and from N. Wales : (*J. M. Davies*), in the collection of the University of Durham, *det.* Bagnall.

Pseudanurophorus binoculatus Kseneman, 1934

Westmorland : Moor House National Nature Reserve, frequently recorded from *Festuca* grassland throughout 1953 and 1954 ; Alston, 16.viii.52, very numerous in litter from several spruce plantations. Co. Durham : High Force, Teesdale, 24.iii.53, in deep *Fagus* litter.

Folsomia montigena Stach, 1947

Scotland : Edinburgh, Corstorphine Hill, 8.iv.53, in oak litter. Gisin (1949) regards this as a synonym of *F. spinosa* Kseneman, but since none of this material shows the spinous margin to the *PAO*, Stach's name is retained as more descriptive of these particular animals.

Isotomina scapellifera Gisin, 1955

As no illustrations were given with the original description, and as further extensive material has enabled some details to be added to the description, illustrations and short supplementary notes are presented here.

Description as given by Gisin (1955 : 140) but in the British material examined here the number of sensillae on Abd. V–VI is 4 + 4. Thus, in addition to the two sets of three, " flame-shaped " setae arranged in triangles, there is on each side a more slender, cylindrical sensilla lying parallel to the posterior row (fig. 44). Antenna IV with 6 short stout sensillae and 6 longer, slender sense hairs and in addition a characteristic subapical sagitate seta (fig. 41).

In all other details this material agrees perfectly with Gisin's description and there can be little doubt that it is conspecific with the Swiss species. Devon : Harpford Wood, near Exeter, 26.1.53, in litter of *Quercus*, *Pteridium* and *Calluna*, about 20 individuals, (*P. D. Gabbutt*). Notts. : Clumber Park, near Nottingham, 5.iv.55, in *Taxus* litter in well established woodland, very numerous.

(to be continued)

References

Bagnall, R. S., 1939, Notes on British Collembola. *Ent. mon. Mag.* **75** : 188–200.
——, 1940, Notes on British Collembola. *Ibid.* **76** : 97–102, 163–74.
Carpenter, J. R. and Evans, W., 1899, The Collembola and Thysanura of the Edinburgh district. *Proc. R. phys. Soc. Edinb.* **14** : 221–66.
Cassagnau, P., 1953, Faune française des Collemboles. II. Anurophoriens de haute montagne. *Rev. franç. Ent.* **20** : 150–6.
Denis, J. R., 1947, Sur la faune française des Aptérygotes. XXV (recte XXIII). *Bull. sci. Bourgogne*, Suppl. : 1–12.
Gisin, H., 1949, Notes sur les Collemboles avec déscription de quatorze espèces et d'un genre nouveaux. *Mitt. schweiz. ent. Ges.* **22** : 385–410.
——, 1952, Notes sur les Collemboles avec démembrement des *Onychiurus armatus*, *ambulans* et *fimetarius* auctorum. *Ibid.* **25** : 1–22.
——, 1953, Collembola from Jan Mayen Island. *Ann. Mag. nat. Hist.* (12) **6** : 228–34.
——, 1955, *Proisotoma* (*Isotomina*) *scapellifera* n. sp. (Collembola). *Mitt. schweiz. ent. Ges.* **28** : 140.
Goto, H. E., 1957, Some further Collembola from Shillay, Outer Hebrides. *Scot. Nat.* **69** : 1–10.

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